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Nasal Intubation for Adenotonsillectomy Under General Anesthesia

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ABSTRACT

Introduction: Tonsillectomy (± adenoidectomy) is performed for recurrent tonsillitis or obstruction of the upper airway. The objective of this work was to assess nasal intubation during tonsillectomy (± adenoidectomy) under general anesthesia.

Materials and Methods: ASA I children scheduled for elective tonsillectomy (± adenoidectomy) were included in current study. Surgery was done under general anesthesia using nasal intubation. Complications of nasal intubation were recorded such as epistaxis, adenoid injury, nasoparyngeal injury, tube obstruction, infection of sinuses or chest, aspiration. Easy access and use of instrumentations was assessed.

Results: This study included 200 children; 116 (58%) males and 84 (42%) were females with mean age of 5.6 ± 1.6. Apart from mild controllable epistaxis (in 3 cases) and posterior pharyngeal mucosal tears that treated conservatively (in 2 cases), no other complications were reported. Surgeons noticed wider surgical field allowed easy use and control of the instrumentation during surgery.

Conclusion: Nasal intubation is safe and not associated with significant complication. Additionally, it allows more space facilitating the operative work during tonsillectomy in pediatric patients.

INTRODUCTION

Worldwide, tonsillectomy is one of the most common surgical procedures performed in children. It is indicated for recurrent tonsillitis or when causing upper airway obstruction (1). Nasal endotracheal intubation is employed in the operating room for intraoral and oropharyngeal surgeries. Some authors advocate using nasotracheal intubation for minor otolaryngologic and maxillofacial surgeries. Awake nasal fibroptic intubation can be used for securing the airway in patients with cervical spine injury, patients with intraoral mass lesions and patients with limited mouth opening(2). Surgical procedures in the oral cavity often require nasotracheal intubation (NTI) to facilitate surgical access. The potential for trauma is inherently greater with NTI than with orotracheal intubation because the tube passes through the narrow nasal passages. It is hypothesized that passage the nasotracheal tube (NTT) can traumatize nasal passages, causing bleeding, bacteremia, avulsion of a turbinate, or even

retropharyngeal dissection. The intermediate step in NTI, usually performed blindly as the NTT is passed from the naris to the nasopharynx, is particularly traumatizing (3). However, there is no previous study on nasal intubation in children undergoing tonsillectomy. The current study aimed to assess the use of nasal intubation during adenotonsilectomy under general anesthesia.

MATERIALS AND METHODS

After approval by the institutional review board and obtaining a written informed consent from parents, 200 ASA I children scheduled for elective tonsillectomy (± adenoidectomy) were included in current study during the period from March 2013 to February 2016. Patients had known hypersensitivity to used anesthetic drugs, unfit patients for general anesthesia, patients on regular use of analgesic or received analgesic 24 hours before surgery and patient need endoscopic adenoidectomy were excluded for the study. All patients were subjected to full history taking, clinical examination, routine preoperative laboratory testing and plain X-ray of the nasopharynx. Nasal examination using anterior rhinoscopy prior to intubation was done to determine the wider side which will be used during intubation and to find out any other exclusion criteria for nasal tubes such as bilateral nasal polypi, severely deviated S shaped septum, bilateral severely hypertrophied inferior turbinates, and presence of any nasal mass.

Anesthetic technique: The same anesthetic protocol was used in all patients including premedication with oral midazolam (0.5 mg/kg) 30 min preoperatively. In the operating room, heart rate, blood pressure, oxygen saturation and temperature were monitored. Induction of anesthesia was achieved by 1.5% incremental doses of sevoflurane up to 6%. Isotonic solution 3 to 5 ml/kg/h was given intravenously during surgery. Atropine 0.02mg/kg, fentanyl 1 mcg/kg and propofol 2-4 mg/kg were administered. After neuromuscular blockade was achieved by 0.15 mg/kg cisatracurium, vasoconstrictor nasal drops (oxymetazoline 0.05%) was applied. Then the proper sized endotracheal tube was lubricated with lignocaine 2% gel (Xylocaine jelly®, AstraZeneca AB, Sodertalje, Sweden) and inserted nasally in the predetermined nostril. If feeling resistance during advancement of the endotracheal tube, the tube was withdrawn and reinserted in the other nostril. If facing difficulty to pass the endotracheal tube in both nostrils the tube was inserted orally. Mackintosh laryngoscopy and Magill forceps (if needed) were used to facilitate the intubation after proper clearance of the oral cavity. Anesthesia was maintained with sevoflurane 1.5–2% in oxygen and nitrous oxide (35%:60%). Ventilation was adjusted to keep end-tidal CO2 between 32 and 40 mm Hg. I.V. acetaminophen (Perfalgan® 100 ml vial, UPSA, France) 15 mg kg−1 was infused after induction. All patients were monitored using electrocardiography, pulse oximetry, non-invasive arterial pressure and end-tidal CO2. After end of surgery and proper hemostasis, residual neuromuscular block was reversed with atropine 0.02 mg/kg and neostigmine 0.05 mg/kg after discontinuation of anesthetic gases then the patient was extubated and shifted to post anesthesia care unit in tonsillectomy position. Oxygen saturation, heart rate and blood pressure were monitored with observation for Bleeding, laryngospasm and any other complications. After full recovery patients were shifted to the ward.

Surgical work: The patient was in supine position with a sand bag was placed under their shoulders. Boyle-Davis mouth gag was inserted. Any blood in the oral cavity resulted from intubation was cleared. A suction catheter was inserted in the other side of the nose facilitating clearance of blood resulted from adenoid curettage. Adenoidectomy (if needed) was done first using sharp adenoid curettes in the conventional way on both sides of the nasopharyngeal endotracheal tube and the surgeon palpated the adenoid bed and repeat the curettage to assure complete removal to obviate need for endoscopic removal(4). Then two gauze packs of suitable size were inserted in the nasopharynx along both sides of the tube for hemostasis and were removed after the end of tonsillectomy. Tonsillectomy was then performed by total bed dissection was performed. Lower pole was ligated (by silk) in all cases and hemostasis was achieved by bipolar cautery and/or sutures. Extubation was done at the end of surgery and insurance of hemostasis. Complications of nasal intubation were recorded such as epistaxis, adenoid injury, nasoparyngeal injury, tube obstruction, infection of sinuses or chest, aspiration, need of muscle relaxant. Easy access and use of instrumentations was assessed. The visual analogue scale (VAS) of the patients were registered by otorhinolaryngology residents and attending

anesthesiologist at 15 minutes after arrival to post anesthesia care unit (PACU).

Statistical analysis: Statistical analyses were performed using SPSS 14.0 statistical software for Windows (SPSS Inc, Chicago, IL). The significance level was set at $P \leq 0.05$. Quantitative data were expressed as mean and standard deviation (SD). T test was used to compare quantitative data while Chi-square test was used for statistical analysis of qualitative data.

RESULTS

This study included 200 patients for whom tonsillectomy (± adenoidectomy) was performed. Included patients were 116 (58%) males and 84 (42%) were females. Their age ranged between 3 and 9 years (mean; 5.6 ± 1.6). Tonsillectomy alone was done for 38 (19%) patients while adenotonsillectomy was performed in the remaining 162 (81%) patients (table 1).

Table 1: sex, age and surgery performed for included

Surgery performed		Age (years)		Sex	
Adenotonsillectomy	Tonsillectomy	Mean age	Range	Female	Male
172 (86%)	38 (19%)	5.6 ± 1.6	3 - 9	84 (42%)	116 (58%)

The mean of the calculated time for nasal endotracheal intubation was 59.6 ± 12.3 seconds. Endotracheal tube was inserted through the left nasal side in 112 patients (56%) and right side in 88 patients (44%). Mild epistaxis occurred in 3 (1.5%) patients during insertion of the tube and was easily controlled by small ephedrine nasal pack. This pack was removed after extubation without more epistaxis. After opening the mouth to begin tonsillectomy, post nasal blood was detected in 18 patients (9%) that were cleared with no more detected bleeding. Mucosal tear of posterior pharyngeal wall was found in 2 (1%) patients (table 2).

Table 2: Detected Complications

Complications	Number	Percent
Mild epistaxis	3	1.5%
Postnasal	18	9%
Blood collection	2	1%

No evidence of these mucosal tears was apparent or complained by the patients one week after surgery. No postoperative nasal discomfort, crustations, infection sinusitis, otitis media, pneumonia or septicemia were reported. No complains neither from the anesthetists nor the surgeons as regards the nasal intubation to use different surgical instrumentations in the field of surgery.

Surgeons noticed more space allowed for use of the instrumentation during tonsillectomy. No tracheal tube compression or displacement was detected by the anesthetist during surgery. Patients were followed for at least one month with no complains related to nasal intubation.

DISCUSSION

Adenotonsillectomy remains one of the most common surgical procedures that are performed in the world. Anesthesia for adenotonsillectomy with tracheal intubation may be compromised by tracheal tube compression or displacement especially if oral tube is used. Nasal tubes can be better tolerated with lower incidence of unplanned extubation (5) so adenotonsillectomy is expected to be easier and safer using NTI that could facilitate surgical access. But there is a concern regarding the potential fear of nasal trauma with NTI because the tube passes through the narrow nasal passages. Advancement of the NTT was accused to traumatize nasal passages and lead to bleeding due to turbinate avulsion, infections or even retropharyngeal dissection (6).

In this study, the children age ranged from 3 to 9 (mean 5.6 ± 1.6) years and this is the common age of adenotonsillectomy surgery and to assess nasal intubation in children with adenoid enlargement. The mean time taken for NTT was 59.6 ± 12.3 seconds. seconds and this agrees with Holzapfel (7) who recorded the mean time taken of 62 ± 41. While in oral intubation time was 26 ± 30 in a study by Depoix (8). Intubation through the left nasal side was done in 56% of cases and right side was (44%). Elwood (3) found that intubation in the left side was (51%) and right side (69%) and this is insignificant finding to our study.

Mild epistaxis occurred in 1.5% of patients during insertion of the tube. Epistaxis occurred in 7.5% in a study done by El-Seify (9) .This mild epistaxis may be due to mild injury to turbinate or nasal wall or adenoid tissue and it was controlled by a small ephedrine nasal pack which was removed after extubation. This bleeding may occur also in oral intubation as a result of dental injury with incidence range from 1:1000 to 1:9000 Warner (10). Also may be due to pharyngeal trauma mostly lacerations to the oropharynx or tongue injury. This bleeding occurs in 6.8% in a study by Kown (11). In

prospective series, the incidence of bleeding is high, ranging from 18 to 77%, even in experienced hands (5–15).

On opening the mouth, we found postnasal blood in 9% of patients that were cleared using gauze swabs and suction if needed with no more bleeding. This bleeding mostly is due to injury of hypertrophied adenoid or the mucosa of the nasoparynx. Elwood (3) found it (29.4%). Decrease incidence of post nasal bleeding in this study is attributed to increase experience in nasal intubation in adenotonsillectomy in our hospital and taking some prophylactic procedures such as using nasal decongestant substance, examination of the nose to choose the wider side respecting the nasal cycle, using lubricant substance, and small sized tube suitable for the nose. Some anesthetists used hot water to soften the tube as kim et al (5) did. Other factor which decrease incidence of bleeding is the Hawthorne effect, i.e., a change in behavior due to an awareness of the person performing intubation may have proceeded more cautiously than usual, knowing that bleeding was being assessed (11). Mucosal tear on posterior pharyngeal wall was found in 1% which completely healed with no need of repair within one week of surgery. One series reported minor lacerations of the posterior pharyngeal wall in 2% of patients undergoing nasotracheal intubation (12).

No postoperative infections such as sinusitis, otitis media, pnemoniao, and septicemia. This may be due to good preparation of the patient and postoperative antibiotic beside less tube contamination with nasotracheal intubation (13). Similarly, Rouby et al (14) found no sinus or chest infection or septicemia within the first 48 hours following nasal intubation. No postoperative nasal discomfort due to short time of surgery and low incidence of injury to nasal mucosa. In this study we agree with Hall and Shutt (2) who stated that during intra-oral surgery, nasotracheal intubation provides uninhibited access to the mouth facilitating insertion of a Boyle–Davis gag and other instrumentations. The surgical field is enlarged, even for routine surgery such as tonsillectomy. The benefit extends to many head and neck procedures including, uvulo-palato-pharyngoplasty, tongue and other intra-oral surgery.

Thus, nasal intubation for general anesthesia of tonsillectomy was not associated with significant complications. As only mild controllable epistaxis was reported that was easily and rapidly controlled during surgery. It was clearly noticed that surgeons' use of instrumentation during tonsillectomy was easy with wide space as no oral tube that occupied part of the operative field. So nasal intubation facilitates surgical exposure and manipulation during tonsillectomy. Still comparative studies of nasal versus oral intubation for adenotonsillectomy are needed.

CONCLUSION

Nasal intubation is safe and not associated with significant complication. Moreover, it allows more space facilitating the operative work during tonsillectomy in pediatric patients.

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